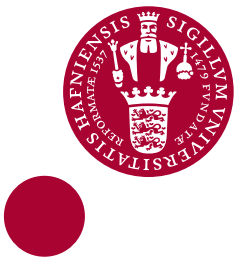

Integration of biotechnology, visualisation technology and robot technology for automated mass propagation af elite trees

Find, Jens

Publication date:
2009

Document version
Publisher's PDF, also known as Version of record

Integration of biotechnology, robot technology and visualisation technology for development of methods for automated mass production of elite trees.

Jens Find

Tissue Culture Laboratory, Natural History Museum of Denmark,

University of Copenhagen, DK-1353 Copenhagen K, Denmark.

jensf@snm.ku.dk

Somatic embryogenesis (SE) is one of the promisisng methods for integration of biotechnology into breeding and propagation of conifers. Especially because SE has some particular advantages for the development of cost effective methods for clonal mass propagation of elite trees:

- It is a very effective and fast method for clonal propagation.
- The method is suitable for automatisation and robot technology.
- The method is, for several plant species, the preferred basis for development of additional biotechnological breeding technologies as e.g. genetic transformation.
- Elite clones can be stored over extended periods in liquid nitrogen at -196°C

However, commercial application of the technology has until now been hampered by two essential problems:

- The production costs per plant must be reduced. Labour costs are low in the early steps of the process whereas they increase dramatically during the later stages (Fig. 1).
- Improved methods must be developed for transfer and acclimatisation of plants from sterile *in vitro* conditions to non sterile (*ex vitro*/*in vivo*) conditions at the nursery.

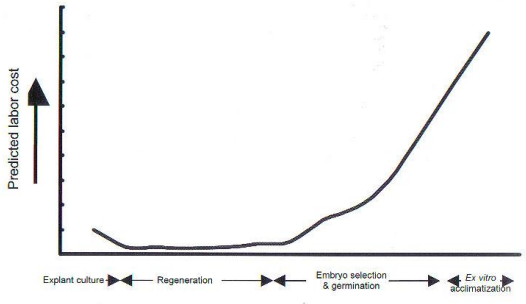

Fig. 1. Predicted labour cost by clonal propagation through somatic embryogenesis.
The labour costs are very low in the early steps of the production, whereas they increase dramatically during the later stages: 'embryo selection & germination' and 'ex-vitro acclimatization'). The aim of the present project is to reduce labour costs associated with the late stages of the production of cloned plants through development of robot- and visualisation technologies. (From Afreen & Zobayed, p. 96, 2005)

The presentation will report on two present project that takes advantage of effective methods for SE in Nordmanns fir (*Abies nordmanniana*) and Sitka spruce (*Picea sitchensis*). Nordmanns fir has special interest for the production of Christmas trees and Sitka spruce has gained renewed interest as a fast growing species for the production biofuels. These species are used as model systems for the development of automated plant production based on robot and visualisation technology.

The commercial aspect of the project aims at: 1) the market for cloned elite plants in the forestry sector and 2) the market for robot technology in the production of plants for the forestry sector.